Video Facilitator's Guide

Fourth Grade

Thoughtful Distribution

Highlighted Process Standards for Mathematics

- #1 – Making sense of problems and persevere in solving them
- #3 – Construct viable arguments and critique the reasoning of others
- #4 – Model with mathematics
- #6 – Attend to precision
- #7 – Look for and make use of structure

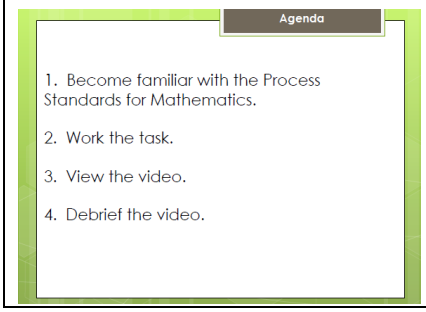
Summary of Video

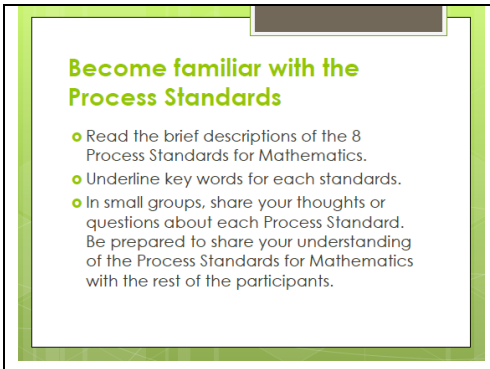
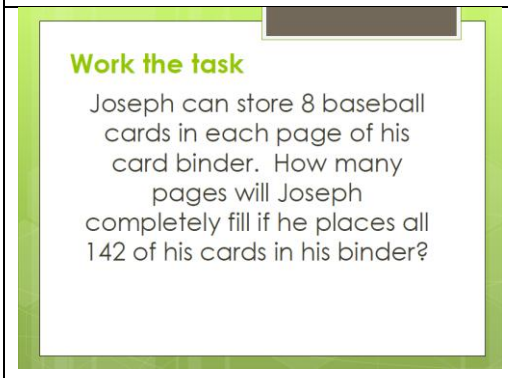
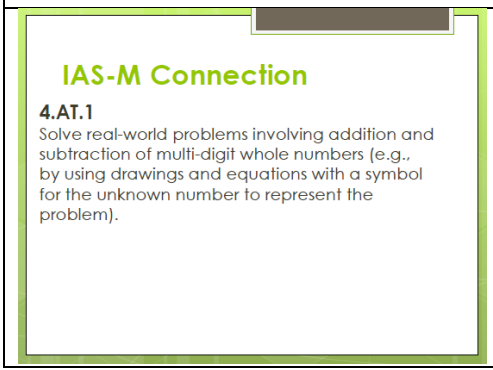
In this lesson, the fourth grade students are working to understand the role of remainders in contextual problems involving division. The teacher poses two division scenarios involving remainders using two different contexts, one where the remainder has no impact on the final solution and another where it does. Students work with partners to complete the tasks, prior to explaining their thinking out loud to the class. The teacher stresses the goal of exposing students to the idea of partial quotients in their problem solving.

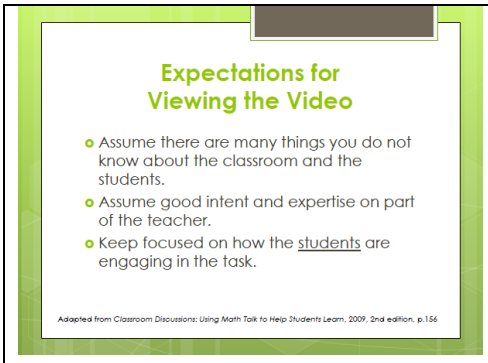
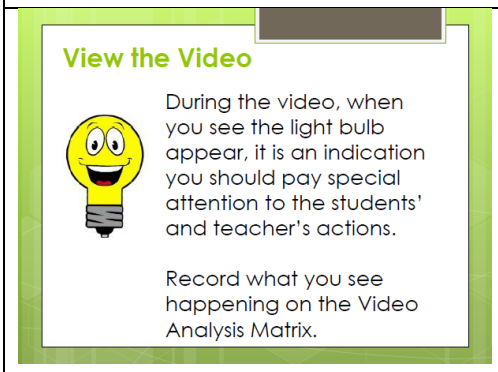
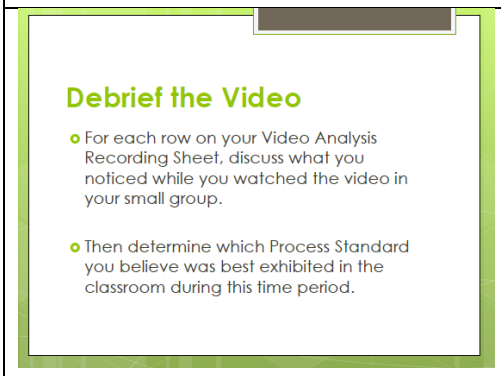
Prepare for Facilitation

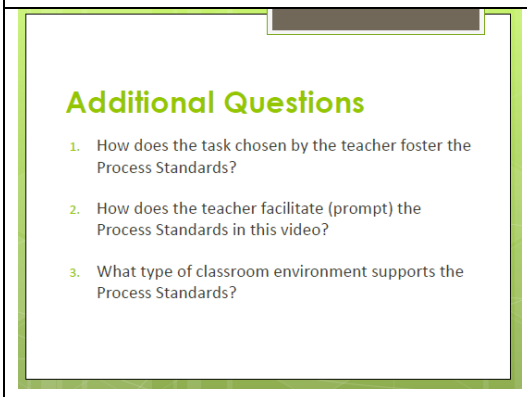
Make sure that you do the following before your presentation:

1. Read Facilitator's Guide Overview and this document that is specific to the Thoughtful Distribution video.
2. Download the video onto desktop of computer.
3. Make copies of handouts.
4. 5. Review the Standards for Mathematical Practice.
6. Review PowerPoint slides provided.
7. Ensure that the presentation room includes appropriate audio and video equipment for showing video.

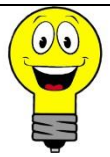
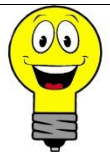
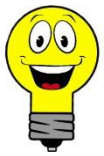
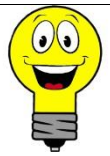
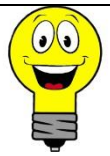
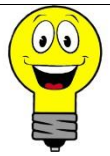
	*Agenda* Briefly share the agenda for the session. Remind participants that the purpose of this session is to introduce teachers to the Process Standards for Mathematics and observe how they are enacted in the elementary classroom.

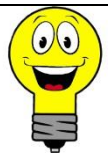
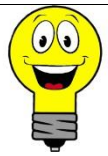
	*Process Standards for Mathematics(PS)* Pass out handout entitled "Brief Version of Standards for Mathematical Practice". Have participants read the descriptions of the eight standards. As they read, have them underline key words for each of the eight standards. After everyone has finished, have the participants get into small groups to share their thoughts about each standard. After sufficient time has passed, debrief the findings in whole group discussion. One way to do this would be to ask each group to share their thoughts on one PS, until all groups have shared or all PS have been discussed. As each group shares, ask for additional input from other small groups and/or add your own ideas, if necessary, to clarify the intent of each practice. Note: This step may be optional if the participants are already familiar with the SMPs or have participated in other video reviews from the *Process Standards for Mathematics in Action!* series.
	*Work the Task* Provide participants with a copy of the task. Read the word problem from the slide, and ask participants to work the task individually and without the use of an algorithm or procedure. As participants are working the task, prompt them to convince you that their strategies and solutions are correct.
	*Connect to IAS for Mathematics* Ask participants to consider the potential of this task to support the development of the skills necessary for children to meet the standard listed below: **4.AT.1** *Solve real world problems involving addition and subtraction of multi-digit whole numbers (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).*

	*Expectations for Viewing Video* Go over the following expectations before viewing the video. 1. Assume that there are many things you do not know about the students, the classroom, and the shared history of the teacher and students on the video. 2. Assume good intent and expertise on the part of the teacher. If you cannot understand his or her actions, try to hypothesize what might have motivated him or her. 3. Keep focused on how the students are engaging in the task(s) and whether they are interacting in ways that align with the PS.
	*Viewing the Video* Before viewing the video, distribute the Video Analysis Matrix. Explain that when the participants notice the light bulb icon, they should begin watching for teacher and student actions that align with one or more of the mathematical practices. View the video together. You may want to pause the video briefly at the end of each time period when an icon is displayed to allow participants time to note their ideas on the Matrix. (See sample matrix in this facilitator's guide for when each time period ends.)
	*Video Debriefing:* After watching the video, ask participants to share in small groups what they noticed for each time period listed in the Video Analysis Matrix. Ask participants to add a third column to the matrix in which they identify the possible PS that are exhibited. After sufficient time has passed, ask if anyone is willing to share his/her PS, supporting it with evidence from the video. Repeat this process for each time period. If necessary, have teachers re-watch segments of the video. Explain to the participants there may be differing opinions about which PS is most prominent; however, each PS mentioned must be backed up by evidence from the video. If necessary, have the participants refer back to the wording of the PS to clarify its meaning. (For large groups of participants, consider the use of small-group discussion prior to whole-group discussion.) Remember that student and teacher actions may be interpreted in

	different ways, so there are no "right" answers, although the table does provide sample responses. The goal of documenting evidence of the Process Standards s to provoke teacher reflection and discussion about the PS.
	If time allows, follow up the discussion of the PS with one or more of these questions: 1. How do the tasks chosen by the teacher foster the PS? *Possible answers:* The tasks chosen highlight the role of context in making sense of solutions of division problems involving remainders, an explicit connection to PS.1. The tasks are open-ended and allow for multiple solution pathways. The contexts allow students to use various models to represent their thinking as they problem solve. 2. How does the teacher facilitate (or prompt) the PS in this video? *Possible answers:* The teacher encourages students to verbalize their understandings of, and solutions to, the problem. The teacher implements questioning techniques that push students' thinking towards forming appropriate rationales for their problem solving choices and critiquing their classmates' reasoning. 3. What type of classroom environment supports the PS? *Possible answers:* The classroom environment depicted in this video example shows students working together to solve problems. The students have grown accustomed to sharing and discussing their work with their classmates and teacher. Students are encouraged to think about mathematics problem solving as process rather than a procedure.

Sample Video Analysis Matrix

Video Clue	Evidence of Student and Teacher Actions
 **1** **2:45**	PS.1 – Students are making sense of problems by putting the problem in their own words. The teacher asks the students to determine what is going on, not necessarily how to solve, but to develop an understanding of the problem that should help students determine entry points into solving the problem.
 **2** **4:31**	PS.1 – The teacher questions student what he will do next and what operation is involved in the problem. He probes the student regarding ideas for other ways the problem could be written. The teacher's questioning moves the student towards solidifying a problem-solving pathway.
 **3** **6:06**	PS.1 & PS.3 – The teacher asks the students to think about what they know about this situation. In this clip, the teacher moves beyond probing the students to understand the problem to asking them to begin to conjecture about the type of solution that students might expect. In particular, the discussion focuses around a possible remainder in the solution. Students conjecture as to how the remainder will need to be handled.
 **4** **7:24**	PS.3 – As the teacher asks for a rationale as to why the student would associate the word problem with a division number sentence, he affords the student an opportunity to construct an argument to defend his problem-solving strategy.
 **5** **8:54**	PS.3 – The student pairs are explaining their reasoning about their problem-solving strategies. Others in the class are listening to the reasoning of others and have the opportunity to ask questions about their thinking.
 **6** **10:14**	PS.2 – Here, the teacher is asking students to consider the solution in the context of the problem. The students are required to contextualize in order to consider the referents in the problem.

 **7** **11:22**	PS.3 & PS.7 – As the student explains his reasoning about the problem, the teacher probes his thinking to explore the patterns as the student solved the problem. The student used the structure of the number system to narrow in on the solution of the problem.
 **8** **12:52**	PS.6 – The teacher uses questioning to have students distinguish between mathematical terms of "tens" and "tenths."
 **9** **18:07**	PS.3 – The student pairs are explaining their reasoning about their problem-solving strategies. Others in the class are listening to the reasoning of others and have the opportunity to ask questions about their thinking.
 **10** **19:15**	PS.6 & PS.8 - In the summary portion of the lesson, the teacher discusses with the students the conventions of multiplication (how to express the problem symbolically, how to read the division problem as "how many groups of x fit inside of y." (SMP #6, attend to precision). In addition, the teacher discusses the strategy of using friendly numbers, such as 10, to simply the problem-solving process (SMP 8, Look for and express regularity in repeated reasoning).